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Tapping Diverse Experiences:
Toward Articulating Knowledge Creation Theory

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ABSTRACT

Tapping diverse experiences is recognised as important for knowledge creation. The authors examine how learning and knowledge creation are affected if a distinction between the extent and nature of employees' involvement, and differences in levels within these, is made. They offer propositions suggesting that the extent and nature of employees involvement differ in their relative contribution to different facets of knowledge creation, including shared understanding, know-why, knowledge creating behaviours and new product creativity. Finally, the authors discuss theoretical implications, future research directions and limitations of this research.

KEYWORDS

Diverse Experiences, Employee Involvement, Know-Why, Knowledge Creation, Shared Understanding

INTRODUCTION

Diverse experiences are important for the creation of new knowledge (Milosovic, Bass & Combs, 2015; Whelan & Carcary, 2011). Knowledge creation is positively enhanced with an exposure to pluralistic specialisations and ideas (Kim & King, 2004; Niu, 2010). Employees with diverse experiences are important sources of pluralistic specialization and ideas based on their experiential knowledge (Park, 2010). Employees' involvement, therefore, becomes crucial for knowledge creation (Latukha, 2016; Nonaka, 1994) in order to tap their diverse experiences. However, we understand little about how employees' involvement contributes to knowledge creation.

The knowledge creation literature indicates two important aspects of employees' involvement - extent and nature. In terms of its extent, scholars have identified that rather than merely involving functional employees (i.e. at one organizational level), employees at all (or multiple) organizational levels should be involved in creating new knowledge (Hedlund, 1994; Nonaka, 1991; Pascale, Millemann & Gioja, 1997). In terms of the nature of involvement, it is indicated that it is not just the mere involvement of employees but how deep is their involvement which matters. For examples, scholars have argued that it is the higher-level as opposed to lower-level learning which creates new knowledge (Argyris, 1991; Argyris & Schön, 1978). Nevertheless, the existing literature has not adequately taken the distinction between the extent and nature of employees' involvement into account in understanding knowledge creation. This understanding becomes particularly important in the wake of the calls for the consolidation and harmonization of the knowledge management concepts (Baskerville & Dulipovici, 2006; Heisig, 2009) and the integration of these concepts with organizational learning (Yoon and Ardichvili, 2010).

Employees' involvement remains to be understood in terms of how it relates to different, important aspects of knowledge creation. Scholars here point to the importance of four aspects which we focus on. Firstly, is the importance of shared understanding. Shared understanding is the mind/

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common knowledge collectively held by organizational members and which binds them together as a cohesive group (Nonaka and Takeuchi, 1995; Nonaka, Toyama & Konno, 2000). Secondly is the importance of an individuals' know-why. Know-why is the deep understanding of the underlying web of cause-and-effect relationships (Quinn, Anderson & Finkelstein, 1998; Sparrow, 1998), a source which generates new ideas and meaning (Argyris & Schön, 1978; Senge, 1990). Thirdly are the knowledge creating behaviours. Scholars have argued that creating new knowledge requires a 'way of behaving' in which learning, reflection and knowledge sharing is continuous (Nonaka, 1994, Nonaka and Takeuchi, 1995). Finally, is the new product creativity. Scholars have suggested that creative outcomes which are characterised by higher levels of novelty, such as discontinuous innovations, contribute more to developing organizational competitiveness than those characterised by lower levels of novelty, such as continuous innovations (Cheng & Van de Ven, 1996; Van de Ven, Polley, Garud & Venkataraman, 2008).

Following the above, we conceptually analyse how the extent and nature of employees' involvement relates to shared understanding, know-why, knowledge creating behaviours and new product creativity. To understand these, we analyse the differences in levels within the extent and nature of employees' involvement in terms of team structure/dynamics, interactions, experimentation and dialogue. Our aim is to contribute to theory-building by developing specific propositions, identifying the differentiated and nuanced relationships between the employees' involvement and knowledge creation. In the subsequent sections, we first review the literature on how knowledge is defined and transformed and the importance of divergent perspectives thereof. Next, we examine the extent to which diverse experiences have been studied to identify the gap. We then explain our framework, and a two-part discussion, i.e. the extent and nature of employees' involvement, and the differences in levels within these, including propositions for the illustrated relationships. Finally, we identify the control variables, and consider the implications, future research directions and limitations of our framework.

LITERATURE REVIEW

Definitions and Concepts

Knowledge is usually distinguished from information. Information is the meaningful organization and/or interpretation of data (facts or observations) (Siadat et al., 2012). Knowledge, on the other hand, is person-embodied and not detached from the individual (Leonard-Barton, 1995). In contrast to the objective, absolute and static view, knowledge is often regarded as relative, transformable and historically transient (Nonaka and Takeuchi, 1995), defined as the process of justifying belief (Nonaka, 1994). Knowledge is also distinguished between its levels, i.e. the point of view, or rank in scale or size of importance, among others, that exists in a particular situation and time. For example, viewing phenomenon on the surface represents knowledge at the superficial level, whereas viewing its underlying governing variables represents knowledge at a deeper level (Inkpen & Crossan, 1990). It represents the systemic ability to subjectively view phenomena at different objective levels, such as lower and higher level, superficial or deep level, single- or double-loop, and so on.

Knowledge is also distinguished between its explicit and tacit components. Explicit knowledge is the formal and structured knowledge (Kim, 1993) and easy to be transferred, communicated and transformed. It is acquired through practice, repetition, reinforcement, imitation, socialization, or logical deduction and formal study (Lam, 2000). In contrast, tacit knowledge is the highly subjective insights, intuitions and hunches (Nonaka, 1991), and the accumulated skills and experiences (Leroy & Ramanantsoa, 1997). It is difficult to be formalized, codified, organized (Kim, 1993) or transferred and communicated, and can only be shared (Lam, 2000). It is internalized through assimilation (Kim,

1993), experience, trial-and-error (Leroy & Ramanantsoa, 1997), immersion and active involvement/interaction (Lam, 2000; Nonaka, 1994).

The processes that allow new knowledge to be created have remained contested. Organizational learning theorists trace the causality in higher levels of learning (Fiol & Lyles, 1985; Hedberg, 1981). Argyris & Schön (1978) differentiate between single and double-loop learning in relation to the `theory-of action'. Theory-of-action, or the `master program', is the set of cognitive rules and reasoning that are used to design and implement actions (Argyris, 1977). Single-loop learning involves incremental, but not substantial, improvements in the theory-of-action, through the detection and correction of errors. Double-loop learning, on the other hand, involves the `theory-of-action' to be questioned and challenged, and substantially improved or modified (Argyris & Schön, 1978). In contrast, the knowledge creation view (Nonaka, 1991; Nonaka & Takeuchi, 1995) shifts the focus from learning *per se* to innovative outcomes that result from learning. Nonaka, Toyama & Byosière (2001: 492) argue that double-loop learning is built into knowledge creating organizations and that "… organizations question and reconstruct existing perspectives, frameworks, or premises on a daily basis through continuous process of knowledge creation". New knowledge is created through tacit-explicit interactions, which require new knowledge not just to be documented, but also shared and distributed organization-wide to enable employees to capture the tacit knowledge of others (Nonaka, 1991).

Know-why, Shared Understanding and Knowledge Creating Behaviours

The specific nature of individual knowledge that allows new knowledge to be created has also remained contested. Organizational learning theorists link double-loop learning with the development of `know-why'. Know-why is the deep knowledge of the underlying cause-and-effect relationships (Quinn et al., 1998). It is this deep understanding which allows the theory-of-action to be questioned and challenged, and subsequently improved or modified. For organizational learning theorists, learning and behaviours are complementary (Argyris & Schön, 1978; Leroy & Ramanantsoa, 1997). A qualification is, however, introduced that cognitive changes may not lead to an observable change (Huber, 1991) or behavioral outcome (Fiol and Lyles, 1985) in the immediate future (Inkpen and Crossan, 1995).

The knowledge creation view, on the other hand, emphasises the importance of shared understanding and knowledge creating behaviours. Shared understanding is the `common cognitive ground' (Nonaka, 1991: 102) or inter-connections between individuals (Von Krogh, Ichijo & Nonaka, 2000) and a collective mind/common knowledge (Grant, 1996). This common knowledge could involve a shared view of what and how, as well as the why of what is being created. However, the common know-why which it might involve could be restricted to the underlying cause-and-effect relationship of the given task and may not represent the systemic ability to view phenomenon at different levels. Shared understanding is also influenced by causal ambiguity, in that the higher the level of causal ambiguity, the greater is the potential gap between prevailing shared beliefs and the actual work practices (Szulanski, Cappetta & Jensen, 2004). Shared understanding originates from `information redundancy' – or the conscious overlapping of company information, business activities, and managerial responsibilities (Nonaka, 1991: 102), which allows people and group to negotiate the meaning of words, actions, situations, and material artefacts (Gherardi et al., 1998), and objectively analyse themselves to improve their direction of thinking (Nonaka et al., 2001). Hence, knowledge creation is `a way of behaving' (Nonaka, 1991) in which knowledge is continuously shared, distributed, communicated and reflected upon.

We argue that new knowledge originates from the capturing of the underlying cause-and-effect relationships, which subsequently allows apparently two different phenomena, but with similar underlying basis, to be interrelated, in what Nonaka (1991: 101) terms as an `analogy'. Nonaka et al. (2001: 495) highlight that "…the association of two unlike concepts through metaphor often leads to the discovery of new meaning and even to the formation of a new paradigm". We further argue that if tacit and explicit knowledge, rather than as either-or phenomena, are analysed in terms of the nature and degree of the inter-relationship, it can be shown that the higher the level of know-why,

the greater is the degree of tacitness (Akbar, 2003), which makes such knowledge difficult to be codified, and even if codified, difficult to be transferred/acquired. Best-practices are unable to transmit hidden logics and struggles (Kleiner & Roth, 1997) and difficult to be imitated (Szulanski, 1996, see also 2001, 2016). Consequently, for know-why to be internalised what is needed is deviance, i.e. an exposure to comparative reference points. These reference points can be obtained in a number of ways, such as, among others, learning from experiences of others (Weick, 1991), obtaining divergent perspectives (Leonard & Straus, 1997), or an exposure to chaotic versus stable conditions (Cheng & Van de Ven, 1996).

Diverse Experiences

The need to tap diverse experiences is important for knowledge creation. Scholars have emphasised the need to tap differentiated experts with heterogeneous specialisations (Kim & King, 2004; Ramkrishnan & Boland, 1996). Tapping diverse experiences allow organizational members to develop and/or generate different approaches and perspectives (De Long & Seemann, 2000). As shown in Table 1, diversity has been well studied at the organizational, individual or group levels. For example, studies at the organizational level have suggested the link between knowledge creation and diversity in organizational contexts (Cheng & Van de Ven, 1996), capabilities (Grant, 1996), experimentation (Garvin, 1993; Quinn et al., 1998), and training/learning methods (Hong & Kuo, 1999; Nevis et al., 1995; Quinn et al., 1998). Others study diversity in relation to the tacit knowledge transfer (Anand, Glick & Manz, 2002; Araujo, 1998; Gherardi, et al., 1998) and/or its capture (Nonaka, 1991; Hedlund, 1994). Similarly, at the individual level, studies have suggested a link between knowledge creation and diverse skills (Davenport & Prusak, 1998; Hayward & Sundnes, 2000), thinking styles (Sparrow, 1998), learning approaches (Garvin, 1993) and experiences (Leonard & Straus, 1997; Quinn et al., 1998. Likewise, studies at the group level link knowledge creation with the heterogeneous nature of teams (Nonaka, 1991; Pascale, et al., 1997), employees' involvement (Hong and Kuo, 1999; Leonard and Straus 1997), and conflicts and disagreements (De Long & Seeman, 2000; Eisenhardt, Kahwajy & Bourgeois, 1997; Phan & Perdis, 2000). Other studies have focused on the levels, such as the surface or visible demographic characteristics and deep-level diversity or the underlying tacit attitudes of individuals (Harrison, Price & Bell, 1998) and argue that group functioning increases the relevance of the latter over time (Harrison, Price, Gavin & Florey, 2002). What is also being increasingly recognised is that tacit knowledge capture and holistic thinking are heavily intertwined with pluralistic interactions (Chuang et al., 2016; Ritala et al., 2015). In spite of this realisation, diverse experiences are yet to be analysed in-depth, as a research topic in its own right.

What has remained scattered and less analysed is the distinction between diversity at a given and at different levels. For example, in terms of individual skills, diversity at a given level is akin to functional diversity, whereas diversity in levels relates to the quality level of individual skills/experiences (Leonard-Barton, 1995; Leonard and Straus, 1997). While studies have emphasised the importance of diversity in levels of experiences (Quinn et al., 1998; Sparrow, 1998) they do not analyse these by contrasting them from functional diversity. This distinction also remains implicit rather than explicit in other studies on knowledge creation (Garvin, 1993; Gherardi et al., 1998; Nonaka, 1991). Similarly, in terms of employees involvement, while studies highlight the need for involving employees at all organizational levels, rather than just functional employees (Hedlund, 1994; Leonard & Straus, 1997; Nonaka, 1991), this distinction remains to be clearly spelled out for analysis purposes. It also not spelled out in studies analysing diversity at the group level (Eisenhardt et al., 1997; Grant, 1996). Likewise, there are ample studies highlighting the importance of diversity in processes (Quinn et al., 1998; Eisenhardt et al., 1997; Hong & Kuo, 1999; Sparrow, 1998), the processes/tasks are rarely differentiated in terms of different levels. Processes/tasks at a given level would involve, for example, routine activities, whereas those at different levels would systemically involve different levels of learning, processes and activities. For example, in terms of team work processes/tasks at a given level would involve team members straight-forwardly contributing information without questioning

Table 1. Empirical evidence – the concept of diversity

Studies Citing the Importance	*Diversity as an Input Variable(s)*	*Output Variables*
Organizational Learning		
Cheng and Van de Ven (1996); Nonaka (1991)	Organizational environment and context	Knowledge exploitation/contraction versus exploration/expansion
Grant (1996)	Organizational capabilities and capability levels	Knowledge integration and absorptive capacity
Garvin (1993); Hedlund (1994); Hong and Kuo (1999); Nevis et al. (1995); Quinn, et al (1998)	Learning structures and methods, including training	Tacit knowledge capture
Anand et al (2002); Arajuo (1998)	Networking efforts and its nature	Tacit knowledge capture and social capital
Garvin (1993); Gherardi et al. (1998); Nonaka (1991)	Knowledge transfer mechanisms and socialisation	Shared understanding, socialisation and individual and organizational learning linkage
Nonaka (1991); Hong and Kuo (1999)	Job rotation	Shared understanding and knowledge development and use
Garvin (1993); Senge (1990)	Experimentation	Learning organization
Group Learning		
Hong and Kuo (1999); Leonard and Straus (1997); Nonaka (1991, 1994); Pascale et al. (1997)	Employees involvement	Change management, shared understanding, pluralistic learning, and creative abrasion/chaos
Nonaka (1991); Pascale et al. (1997)	Groups and teams	Change management, multiple approaches and shared understanding
Delong and Seemann (2000); Eisenhardt et al. (1997); Leonard and Straus (1997); Phan and Peridis (2000)	Conflicts, disagreements, and paradox	Creativity, managing conflicts, knowledge development and organizational effectiveness.
Hedlund (1994); Nonaka (1994); Ramkrishnan and Boland (1996)	Interactions and dialogue	Tacit knowledge capture, pluralistic interactions, holistic understanding and knowledge integration
Individual Learning		
Harrison et al. (1998); Harrison et al. (2002)	Attitudes and demographic traits	Effects of group learning on relevance
Garvin (1993); Sparrow (1998)	Learning approach	Impact on dialogue and organizational learning
Davenport and Prusak (1998); Hayward and Sundres (2000); Leonard and Straus (1997); Leonard-Barton (1995)	Skills and capabilities	Work-related curriculum, organizational competitiveness and T-shaped as opposed to A-shaped skills
Leonard and Straus (1997); Sparrow (1998)	Thinking styles	Creativity and conflict resolution
Cheng & Van de Ven, 1996; Leonard-Barton (1995)	Divergent and convergent thinking	Product innovations
Leonard and Straus (1997); Quinn et al (1998)	Previous experiences and levels of experiences	Path dependency versus creative abrasion, creative abilities, organizational success and developing professional intellect

or challenging each other's ideas. In contrast, processes/tasks at different levels would not just involve team working, but also disagreement and dialogue to expose team members to blatant deviations from the norm (Glynn, Barr & Dacin, 2000), such as divergent viewpoints, paradox (Eisenhardt, 2000; Westenholz, 1993) or discontinuity and change (Leana, 2000).

Creativity and Innovation

Creativity is traditionally construed as having new ideas or escaping from old ones (see Leonard & Straus, 1997). Creativity in the context of knowledge creation, however, is not just about having original ideas but also the ability to translate these ideas into behaviours and action (Von Krogh et al. 2000). Creativity has also been defined in terms of its levels, such as continuous and discontinuous innovation. Discontinuous innovation typically refers to a product which involves significantly new technologies or is aimed at significantly different markets (Veryzer, 1998) and is difficult to be replicated/copied by the competitors (Grant, 1996). At the technology level, Enos & Park (1985: 9) consider a technical change "…as `major' if its development is considered `difficult' to accomplish by men skilled in the pertinent arts….while it is considered `minor' if its development is judged to be relatively easy". For Perry-Smith & Shalley (2003), the reconfiguration of existing ideas is creativity at a lower level, whereas a new radical idea, which represents a major breakthrough, reflects higher-level creativity. Moorman (1995) indicates that a higher-level innovation is the one which challenges existing ideas and/or offers new ideas to the product category, as well as spawns new ideas for products in other categories.

Diverse experiences have been inadequately analysed in relation to a creative event. While the importance of diverse experiences in creativity is invariably highlighted (Leonard & Straus, 1997; Quinn et al., 1998; Sparrow, 1998) only occasionally it has been analysed in relation to levels of creativity, such as discontinuous versus continuous innovations (Cheng & Van de Ven, 1996; Nonaka, 1991). These two studies, however, are more focused on the wider differences in levels, and the effects of these wider distinctions have already been recognised (Weick, 1991). What remain to be examined, therefore, are the conscious efforts that organizations employ to tap subtle differences in levels of tacit experiences and divergent interactions, and how these are translated into those in creative outcomes/behaviours.

Knowledge Ontology – the Extent versus Nature of Employees' Involvement

The distinction between the extent and nature of employees' involvement can also be seen in the context of organizational and individual learning. Organizational learning involves the sharing and distribution of individual knowledge among organizational members (Lam, 2000). While theories of organizational learning generally stem from those in individual learning (Hedberg, 1981; Leroy & Ramanantsoa, 1997), individuals are largely viewed as agents through whom organizations learn (Kim, 1993; Shrivastava, 1983). Organizational learning serves as the binding force for managers with diverse concerns through shared understanding, mental models and conceptual schemes (Hedberg, 1981; Kim, 1993).

At the empirical front, studies have attempted to link individual and organizational learning (Davenport & Prusak, 1998; Hayward & Sundnes, 2000; Leonard-Barton, 1995), or organizational and individual learning, in that order (Gherardi et al., 1998; Hong & Kuo, 1999; Nevis et al., 1995). Within these two extremes is the role of group learning (Crossan, Lane & White, 1999; Crossan, Maurer & White, 2011; Inkpen & Crossan, 1995). Group learning provides a shared context for individuals to interact and engage in dialogue (Nonaka, 1991). However, what remains to be studied in-depth is the extent to which group learning represents employees at all organizational levels, and the nature of interactions within a group which facilitates greater individual learning. The empirical literature which brings together these dimensions is scanty. While studies have argued for the wide-spread involvement of employees, and/or the need for divergent perspectives (Hedlund, 1994; Nonaka,

1994), the extent to which groups actually represent such involvement and nurture divergent viewpoints to bring together the organizational and individual learning dimensions remains to be understood.

The extent versus nature of employees' involvement can also be linked with the traditional structural versus processual debate on knowledge creation. Knowledge in the structural perspective is an objective, static and discrete cognitive entity that individuals and organizations possess, and which is created via specific social processes. Knowledge in the processual perspective, on the other hand, is developed through practice, action and social relationships (Newell et al., 2002). In practice, however, knowledge creation is recognised both a cognitive and social entity (see Gherardi et al., 1988). Most empirical studies on diversity have attempted to cover both the structural and processual dimensions of learning (Garvin, 1993; Hedlund; 1994; Housel & Bell, 2001; Leonard & Straus, 1997; Nonaka, 1991; Senge, 1990). What remains to be investigated, however, is whether or not these dimensions, which we translate in terms of the extent versus nature of employees' involvement, respectively, are independently related to creative outcomes.

FRAMEWORK AND PROPOSITION DEVELOPMENT

Our framework combines the extent and nature of employees' involvement with differences in levels which may exist within these. As previously discussed, references to these dimensions have remained scattered in the literature. We organize these referenc

In terms of the extent to which diverse experiences are tapped, we distinguish between involving employees at a single as opposed to multiple organizational levels. Involving employees at a single organizational level is reflected when employees in different functions, but not necessarily at different organizational levels, are involved in the learning process. As shown in Table 2, this diversity has been referred to in terms of group structures, where autonomous, self-organizing (Nonaka, 1991) and heterogeneous project teams (Ramkrishnan & Boland, 1996) across different functions with differentiated experts (Pascale et al., 1997) are created. It is also reflected in interactions and dialogue if these are mostly lateral, such as multi-functional (Hedlund, 1994), or in experimentation if only employees at one organizational level are involved. Diversity in levels of employees' involvement, on the other hand, is reflected when learning involves employees at multiple organizational levels, quite apart from their functional orientations. As shown in Table 2, such diversity has been referred to in many ways. For example, when employees across hierarchies are involved in teams (Nonaka, 1991: Pascale et al., 1997) and in dialogue and experimentation (Hong & Kuo, 1999). It is also reflected when employees with different capability levels (March, 1991), such as A-shaped (or functional/disciplinary) skills representing lower level capabilities as opposed to T-shaped (or the ability to apply knowledge across situations) representing higher level skills (Leonard-Barton, 1995).

In terms of the nature of tapping diverse experiences, we distinguish processes/tasks in terms of those at a given level and those at different levels. Diversity at a given level is reflected when the processes/tasks employed represent different methods, frameworks, etc., but which only characterize perpetuation of practice and established norms and procedures and not deviations from these. As shown in Table 2, such diversity is reflected when teams design and develop different approaches (De Long & Seemann, 2000) and multiple alternatives (Eisenhardt et al., 1997; Housel & Bell, 2001), but which may are not radically different from past practices. It is also reflected in interactions when information or best practices are obtained, but rarely challenged, questioned and critically analysed. It is also reflected in experimentation, which may be diverse, but have low degree of uncertainty (Garvin, 1993). Similarly, diversity at a given level is represented in dialogue when it is open and constructive, but with well established field rules (Eisenhardt et al., 1997; Nonaka, 1991).

Diversity at different levels, on the other hand, is reflected when the nature of processes/tasks employed, for instance, involve different levels, such as of learning (double-loop as opposed to single-loop), and where significant deviations from norms, practices, etc. are involved. As shown in Table 2, such diversity is reflected when teams not only develop different approaches, but also

Table 2. Employees Involvement and Differences in Levels within

	Diverse Experiences at a Given Level	Diverse Experiences at Different Levels
Extent of Employees Involvement	***Involving Employees at a Single Organizational Level*** *(e.g. functionally diverse, but only senior employees)* *a) Team Structure:* Multi-functional (Pascale et al., 1997; Nonaka, 1991) or heterogeneous teams with differentiated experts (Ramkrishnan and Boland, 1996). *b) Team Interactions:* Mostly lateral – with functionally diverse employees (Hedlund, 1994) but only at a single organizational level (such as senior management). *c) Team Dynamics:* Obtaining perspectives from multi-functional employees (Hedlund, 1994).	***Involving Employees at Multiple Organizational Levels*** *(e.g. senior as well as junior employees irrespective of their function)* *a) Team Structure:* Autonomous and self-organizing teams across hierarchies (Pascale et al., 1997; Nonaka, 1991). *b) Team Interaction:* Vertical - Among employees at different capability levels (Garvin, 1993; Grant, 1996; Pascale et al., 1997; Leonard and Straus, 1997; Hong and Kuo, 1999), involving people at all levels (experts versus non-experts) (Hedlund, 1994) which may or may not be functionally diverse. *d) Team Dynamics:* Obtaining perspective from employees at different organizational levels (Hedlund, 1994; Nonaka, 1991).
Nature of Employees Involvement	***Employing Processes/Tasks Representing One Level*** *(e.g. routine processes/tasks, and not deviations from norms)* *a) Team Dynamics:* Teams divided into competing groups or sub-teams (Delong and Seemann, 2000) to generate variety of perspectives (Pascale et al., 1997; Nonaka, 1991) and develop different approaches, alternatives and best path options (Eisenhardt et al., 1997) and design and construct sub-paths (Boeing 777, Housel and Bell, 2001). *b) Interactions:* Mainly to acquire `best practices' (Kleiner and Roth, 1997) or functionally diverse information as independent specialised inputs. *c) Dialogue:* Setting of field rules, such as openness of expression and constructive criticism (Eisenhardt et al., 1997; Nonaka, 1991).	***Employing Tasks/Processes Representing Different Levels*** *(e.g. non-routine processes/tasks as significant deviations from norms)* *a) Team Dynamics:* Teams as collaborative unit to generate different levels of perspectives (Pascale et al., 1997; Nonaka, 1991) and compare successful and unsuccessful projects, and lessons learned (case studies, specific revisions, and project reviews) (Garvin, 1993). *b) Interactions:* To obtain views, opinion and feedback, and questioning and challenging the appropriateness of the underlying purpose, principles and assumptions/ governing variables (Argyris, 1991) of the information or best practices. *c) Dialogue:* Deliberate introduction/use of ambiguity/ paradox (Westenholz, 1993). Value of `Ugly Duckling' is recognised (Leonard and Straus, 1997).

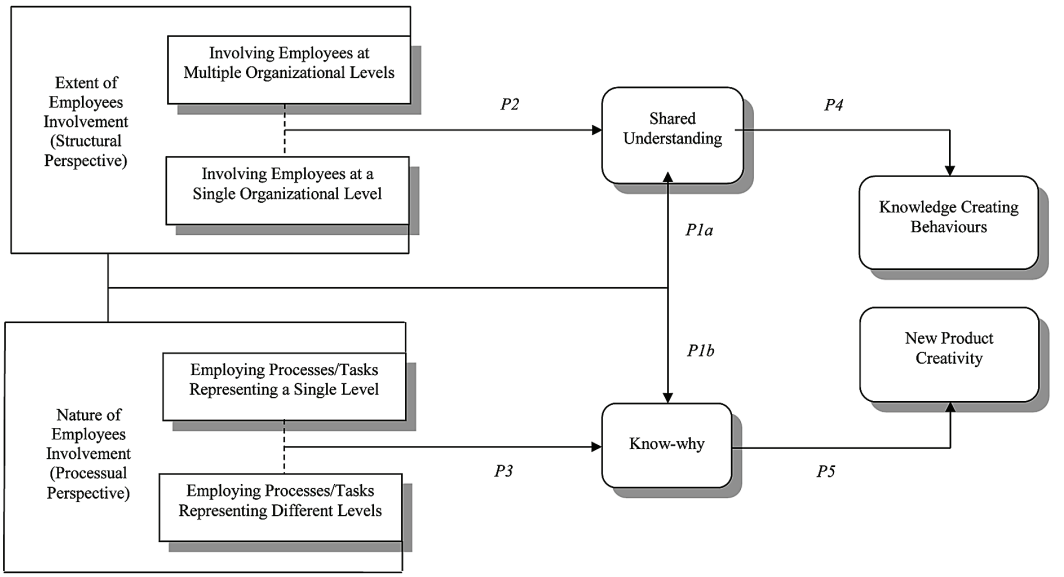
compare unsuccessful projects with successful ones, and discuss lessons that are learned from these (Garvin, 1993). It is also reflected in interactions when employees challenge and question their views, opinions and best practices, as opposed to just contributing information. It is also reflected when experimentation which may or may not work (Housel & Bell, 2001) or involves high degree of uncertainty is encouraged (Garvin, 1993) as opposed to non-risky experimentation. Similarly, diversity in levels of processes is also reflected when dialogue involves deliberate introduction or use of ambiguity (Nonaka and Takeuchi, 1995) and paradox (Westenholz, 1993) with due recognition to the value of `Ugly Duckling' (Leonard & Straus, 1997).

The subsequent discussion translates this framework and its various dimensions, such as presented in Figure 1, into various sets of propositions for investigation purposes.

The Extent versus Nature of Tapping Diverse Experiences

Both the extent and nature of employees' involvement have been recognised as important in knowledge creation (Nonaka, 1994, Nonaka & Takeuchi, 1995). We argue, however, that these may play different roles in knowledge creation. Studies have earlier highlighted the importance of `engaging'

Figure 1. Research framework



or `incorporating' employees (Pascale et al., 1997) and that `active' involvement of employees also contributes to developing shared understanding (Nonaka, 1991). In terms of the extent of employees' involvement, it can be logically suggested that the greater the involvement of a large number of employees, the greater is the likelihood of developing shared understanding.

Our argument goes a step further. We argue that even if employees actively participate, the information that is shared may or may not be of divergent nature. As discussed earlier, what is needed for the development of know-why are the divergent reference points. Hence, much as the employees' involvement may be active and develops shared understanding, it may contribute less to meaningfully develop the know-why. Employees at junior positions are more involved in single-loop compared to double-loop learning (Snell & Chak, 1998). It can therefore be suggested that the extent of employees' involvement may contribute more to developing shared understanding than know-why.

In terms of the nature of employees' involvement, the role of divergence is unanimously recognised. However, for the knowledge creation view divergent information originates from dialogue (Nonaka, 1994), natural crisis, or intentional efforts to evoke a sense of crisis (Nonaka et al., 2001). The distribution of modified knowledge is also perceived as a way of subverting the established knowledge/power relations within a social context (Gherardi et al., 1998). For organizational learning theorists, on the other hand, divergence originates from double-loop learning. Rothman & Friedman (2001: 583) state that, "Double-loop learning is a form of conflict resolution in which organizational members inquire into the reasoning behind the positions they take and the meaning of these positions for them". We, on the other hand, argue that what is important for know-why to be developed is an exposure to contradictory reference points, irrespective of where they originate from. In other words, employees' involvement will lead to the development of know-why only if divergent views and opinions are generated. While heterogeneous specialisations are more likely to have productive conflicts (Eisenhardt et al., 1997a), that is not a direct outcome of the extent of employees' involvement, rather more of the nature of interactions that ensue. Equally, it could be argued that processes which allow divergent positions to emerge, without necessarily involving a large number of employees, may serve the purpose. However, the lack of involving large number of employees could restrict the extent to which shared understanding is developed. It can therefore be suggested that the nature of employees'

involvement may contribute more to the development of know-why than shared understanding. Thus, we suggest the following introductory set of propositions:

P1a: The extent of employees' involvement contributes more to the development of shared understanding than know-why.

P1b: The nature of employees' involvement contributes more to the development of know-why than shared understanding.

Differences in Levels of Tapping Diverse Experiences

Learning and creativity can also be linked with differences in levels within the extent and nature of tapping diverse experiences. Within the extent of employees' involvement, we propose that involving different employees but at a single organizational level plays a restricted role in learning, compared to involving employees at multiple organizational levels. We articulate Nonaka's (1991) concept of `information redundancy' to develop our argument further. Nonaka et al. (2001: 495) have stated that "…the key to acquiring tacit knowledge is to share the *same* [italics added] experience through joint activities". We argue that involving employees at a given level may generate diverse functional inputs, but each of this input has the ability to stand-alone. It may or may not overlap with other inputs to contribute to towards shared perspectives. Involving employees at multiple organizational levels, on the other hand, increases the likelihood of a mix of superior-subordinate relationships, and hence overlapping experiences. Such experiences may not be independent of other specialised inputs and hence the likelihood of understanding positions of others is increased. In other words, employees' involvement which represents multiple organizational levels is more likely to contribute to the development of shared understanding than that which is not, however functionally diverse the latter may be. Thus, we suggest the following proposition:

P2: Involving employees at multiple organizational levels contributes more to shared understanding than involving employees at a single organizational level only

Within the nature of employees' involvement, we propose that learning processes which represent at given level play a restricted role in learning, compared to those representing different levels. Different levels represent deviations from the tasks, methods, frameworks, etc. that a firm otherwise routinely employs. The literature supports this argument. The role of divergent thinking (Leonard-Barton, 1995), chaos (Cheng & Van de Ven, 1996) and conflicts (Gherardi et al., 1998; Senge, 1990) in learning is well recognised. Greater uncertainty in tasks is positively related to the degree of effort. For example, newer projects involve a higher level of information processing, compared to product modifications and re-launches (Veryzer, 1998). Management teams that challenge one another's thinking develop a more complete understanding of choices and create a richer range of alternatives (Eisenhardt et al., 1997). Nonaka (1991: 104) states that a "…dialogue can – indeed, should - involve considerable conflict and disagreement. It is precisely such conflict that pushes employees to question existing premises and make sense of their experience in a new way".

Not all conflicts, however, may positively contribute to learning. Eisenhardt et al. (1997: 44) refer to the importance of `substantive' (or `cognitive' or `issue oriented') conflict, "…that is centered on alternative courses of action and interpretation of facts, and not conflict that is centered on interpersonal friction and dislike". Rothman & Friedman (2001: 585-593) classify conflicts into: a) `resource frame', which refers to struggles over claims to scarce status, power and resources; b) `interest frame', where conflict arises due to concrete expression of needs, desires, concerns and fears; and c) `identity frame', which extends the earlier two frames into the need for articulation, such as sense of meaning and definition of self, and confrontation of individual and collective identities. It is the latter, so argue Rothman and Friedman, which provides opportunities for engagement for the

purpose of learning and development. In the other two types of conflicts, parties will simply try to find compromises, through bargaining or negotiations, to reach a particular settlement.

Our line of argument focuses on the level, rather than the nature, of conflict (or similar other divergent conditions). Too much turbulence (Fiol & Lyles, 1985) could be dysfunctional to learning (Hedberg, 1981) and could result in confusion or may not result in a cognitive change (Starbuck, 1992). Acknowledging that, we argue that if divergent and chaotic conditions do promote greater learning, then the validity of that claim should not be compromised if the analysis is shifted to subtle differences in levels of divergent conditions. Studies have highlighted these subtle differences in various ways. Weick (1984) argues for allowing `small wins' and small flops' in defining problems. Starbuck & Hedberg (2001) argue that moderate as opposed to chronic failures stimulate attention and inquiry. Friedman, Lipshitz & Overmeer (2001) have linked learning with an `optimal' level of uncertainty which is stimulating enough to create doubt and inquiry, but not being so threatening or challenging as to produce defensiveness. Hence, we suggest that learning processes that employ subtle differences in levels contribute more to the development of know-why than those which may be diverse but devoid of such deviations in levels. Thus, we suggest the following proposition:

P3: Employing learning processes which represents different levels contributes more to the development of know-why than those which represent a given level

Finally, we articulate the chains of relationship between different levels of structures and processes and different facets of knowledge creation. First, we establish the link between diverse experiences, shared understanding and knowledge creating behaviours. As highlighted earlier, studies have linked diverse experiences with shared understanding (Lam, 2000; Nonaka, 1991, 1994; Nonaka & Takeuchi, 1995) and knowledge creating behaviours (De Long & Seemann, 2000; Gherardi et al., 1998; Nonaka et al., 2001). The behavioural effects of shared understanding have also been recognised. In participative activity systems, employees start to value their contacts as resources and begin to tolerate or, better still, recognise the importance dialogue and divergent perspectives/viewpoints (De Long & Seemann, 2000). Greater interaction also allows executives to get to know each other better, and hence feel confident and willing to argue for conflicting views (Eisenhardt et al., 1997a). Following our previous discussion, if tapping diverse experiences at multiple organizational levels is positively related to shared understanding, and that shared understanding contributes to knowledge creating behaviours, the following chain of relationship can be logically suggested:

P4: Involving employees at multiple organizational levels contributes to knowledge creating behaviours through shared understanding.

Furthermore, the chain of association between diverse experiences at different level, know-why and new product creativity can also be established. The link between divergence and creativity (Phan & Peridis, 2000) or performance is well recognised (Eisenhardt et al., 1997a). Studies have shown that conceptual as opposed to instrumental use of information (Moorman, 1995) and divergent as opposed to convergent thinking (Cheng & Van de Ven, 1996) or discussions (Leonard & Straus, 1997) are more suited to creativity. Following these, we suggest a positive relationship between levels of experiences and innovation. We differentiate between shifts and movements in knowledge to separate the information processing and creative dimension of learning, respectively. Employing different levels of processes provides the contradictory reference points that are needed to subjectively capture underlying cause-and-effect relationships which, as argued earlier, are otherwise difficult to be transferred/acquired. Such understanding shifts an individual's knowledge to a higher trajectory. It subsequently allows knowledge to move on a given trajectory by inter-relating apparently dissimilar phenomena. Analogies are found to be made persuasively when message recipients are able to map

attribute relations from some base category (Roehm & Sternthal, 2001). Following our previous discussion, if employing processes which represent different levels contributes to the development of know-why, and that know-why allows the generation of analogies, then the following chain of relationship can be logically suggested:

P5: Employing processes which represent different levels contributes more to new product creativity through know-why.

IMPLICATIONS FOR ORGANIZATION THEORY AND FUTURE RESEARCH

A distinctive feature of our theoretical framework is its generic nature. Earlier, knowledge creation has been widely been regarded as contextual in nature (Nonanka, 1991; Lam, 2002). Our framework, however, shifts the focus from the context, and sources of information within these, to the divergent nature of information that emanates from the context or source. While tacit knowledge is recognised as heterogeneous across firms, unique, and imperfectly mobile and imitable (Ambrosini & Bowman, 2001), we believe that the processes that transform tacit knowledge mainly require deviations from norms and routines. Hence, learning processes may differ among different organizational settings, but the deviations that are generated within these may only differ in levels. As a result, our framework is less, though not completely, as highlighted in the subsequent paragraph, restricted by factors such as the nature of the industry or firm.

We do consider a number of control variables. Earlier, Fiol & Lyles (1985) have classified contextual factors into organizational structure, environment, strategy and culture. Argyris (1977) has highlighted the relationship between learning and turbulent environment. This, however, may not apply to high-hazard industries, such as nuclear and chemical process. Our framework aims to isolate the effects of subtle differences within the tacit component of knowledge. That is best achieved in a relatively stable environment, but where organizations encourage deviations from routines and norms. Another control variable that we consider is the knowledge creating culture of an organization. Core-competencies of a firm over time run the risk of developing into core-rigidities (Leonard-Barton, 1995). Learning orientations (Sadler-Smith, Spicer & Chaston, 2001) and knowledge sharing (Vij & Farooq, 2014) have been found to be positively related to organizational growth and performance. Similarly, greater openness and decentralised structures are known to enhance learning. In other words, for learning to take place, while a major cultural change which is threatening may not be necessary (Nevis et al., 1995), it is necessary that learning organizations do not simply enhance the power of ruling elites (Snell & Chak, 1998) and that learning takes place not for the sake of it, but to develop a competitive advantage. In addition, while the speed with which a new product is developed is important (Takeuchi and Nonaka, 1986), a comprehensive approach to product completion (Cooper 2008) may require more time. Hence, time available to complete an NPD project also needs to be considered.

To identify the specific effects of learning processes, it is also important that prior experiences of individual employees and an organization's networking efforts are isolated. For instance, present theory suggests that creativity is affected by experiences in unrelated compared to related industries (Leonard & Straus, 1997), or by the number of perspectives an individual can adopt (Leonard-Barton, 1995). Granovetter (1973) had earlier indicated the importance of divergent perspectives by noting that we learn more from our weak ties rather than strong ties. Knowledge is also recognised to be developed through external networks and expertise (Anand et al., 2002; Araujo, 1998; Baskerville & Dulipovici, 2006). However, higher levels of networking efforts are reflected when knowledge creating firms obtain creative solutions (Housel & Bell, 2001) and fresh perspectives from unexpected sources and non-experts (Garvin, 1993), or when knowledge transfer takes place between staff/firms working on the same product (or concept) but within different industries as opposed to those working within the same industry.

Implications

In the existing empirical frameworks, researchers have mainly focused on organizational factors and processes which facilitate or inhibit learning. Our framework extends these investigations to distinguish between learning structures and processes, translated in terms of the extent and nature of employees' involvement, respectively. We show that while the extent of employees' involvement does promote shared understanding and knowledge creating behaviours, it is the nature of employees' involvement which determines as to whether or not creative outcomes are actualised. We articulate further that involving employees at multiple organizational levels is superior to involving employees at a single organizational level in generating shared understanding and knowledge creating behaviours. However, new knowledge is created from the understanding of the cause-and-effect relationships. Higher levels of learning activities are superior in developing such understanding and meaningfully affecting know-why and creativity compared to lower levels of learning activities. Thus, our theoretical framework contributes to theory-building which articulates our understanding of: a) the critical elements within the tacit component of knowledge which allow, as opposed to assist, creativity and innovation; and b) how diverse experiences can be effectively tapped to harness these elements.

Our framework also incorporates the ontological dimensions of knowledge creation. Earlier, studies have recognised that organizational learning is institutionalising, whereas group learning is integrating in character (Crossan et al., 1999, 2011; Inkpen & Crossan, 1995). We illustrate that there are levels within a given level, in that group learning itself has microcosmic dimensions of organizational and individual learning. Organizational learning is translated in terms of the extent to which employees are involved, whereas individual learning is translated in terms of the nature of learning dynamics that is involved in group learning. We then relate these with two different objective levels of outcomes, i.e. shared understanding/knowledge creating behaviours to represent organizational learning outcomes, and know-why/new product creativity to represent individual learning (or product) outcomes. By highlighting these nuanced relationships we contribute to enabling organizations to better understand these relationships which they can then take forward, such as in their strategic plans, to foster creativity and innovation.

Another theoretical added value we contribute is to bring together a diverse range of literature not just in organizational learning and knowledge creation, but also in other disciplines, such as strategic management, marketing, technology and innovation, and even economic philosophy. Studies originating from these literatures have identified the role of divergence in learning (Argyris, 1977; Eisenhardt et al., 1997; Garvin, 1993; Leonard-Barton, 1995; Senge, 1990) or creativity (Cheng & Van de Ven, 1996; Leonard & Straus, 1997; Nonaka, 1991, 1994; Nonaka et al., 2001), and the level of divergence that promotes greater learning or creativity (Fiol & Lyles, 1985; Friedman et al., 2001; Hedberg, 1981; Starbuck, 1992; Weick, 1984). Our focus on subtle differences in levels of divergence demonstrates the common thread that runs through these independent works of scholarship.

Another implication of our framework is to indicate the coherence that exists within the knowledge creation literature, such as between the knowledge creation view and the organizational learning theorists' line of thought. We show that these seemingly divergent positions may not be not either-or situations, but could reflect different contributory levels in creativity and innovation. The knowledge creation view by facilitating shared understanding and knowledge creating behaviours establishes a 'way of behaving' as an overarching culture of creativity and innovation, and the cogntivists' perspective by facilitating the development of know-why establishes the basis for the translation of learning or behaviours into actual creative outcomes. By demonstrating that, we point future researchers to a more detailed integration of these divergent positions.

Finally, our framework is consistent with the anthropological and political science perspectives on organizational learning. The bridge between anthropological and organization theory lies in viewing organizations as cultural processes rather than mere structures (Czarniawska, 2001). Similarly, the political science perspective links `political pluralism', or the many-faceted organizational articulation, with the concept of democracy (LaPalombara, 2001). Our framework demonstrates

how pluralistic cultures percolate deep down into the learning structures and processes that are employed by organizations. For us the concept of democracy is not just the involvement of employees at all organizational levels, but also whether or not the processes that are employed allow divergent perspectives and view points to flourish. Such processes expose individuals to divergent reference points, which subsequently generate feed-back loops to fundamentally change behaviours, attitudes, and even cultures.

Suggested Future Research

Our framework opens up a number of significant future research and theory development directions. First is the study of the link between knowledge creating behaviours and new product creativity. In our theoretical framework, we have separated the behavioural and cognitive dimensions of knowledge creation. Our framework suggests that knowledge creating behaviours do facilitate learning, but for new knowledge to be created, these behaviours ultimately need to journey through the know-why of an individual. Researchers could conduct a longitudinal study to examine this journey. Studies have also recognised that learning and behaviours are complementary (Leroy & Ramanantsoa, 1997). Hence, future research efforts can focus on the journey through which know-why may ultimately reflect in knowledge creating behaviours. Related to that is the issue of lag effects in learning. Studies have highlighted the need for learning to be continuous (Argyris & Schön, 1978; Fiol & Lyles, 1985) and that cognitive changes may take time to reflect in terms of behavioural outcomes (Huber, 1991; Inkpen & Crossan, 1995). Following that, researchers could examine as to how involving employees or exposing employees to different levels, feeds into wider distinctions in levels of outcomes in subsequent projects. Another approach to extending our theoretical framework longitudinally is to see its application in terms of the entire innovation journey. Earlier, studies have identified the divergent and convergent nature of activities across the entire innovation journey (Cheng & Van de Ven, 1996; Van de Ven et al., 2008). Researchers could focus on the differences in levels within these, in that, how divergent or convergent are the structure and nature of learning activities from the conceptualisation stage to the implementation stage of a creative event.

The main objective of our framework is to contribute to theory-building, rather than to generalise. The next logical step would be to conduct a more comprehensive set of study for generalisation purposes. Such an approach will also support the exhortations that cognitive science needs to be more assertive (Huff, 1997). In addition, Starbuck & Hedburg (2001) classify learning into three categories: learning by individual people, learning by individual organizations, and learning by populations of organizations. Our framework has mainly focused on integrating individual and organizational learning within a given organization. Future research efforts can extend our framework to examine the patterns of interactions in population of organizations to see as to whether or not these conform with the propositions that we have presented.

Another fruitful area of research is the integration of divergent epistemological positions. Within that, the two main dimensions that need to be articulated are the specific nature of human abilities that: a) allow new ideas to be generated; and b) enable new ideas to be translated into innovative choices. Behavioral approaches to learning are largely unable to explain how people and organizations suddenly act in dramatically novel ways (Starbuck & Hedberg, 2001). Organizational learning theorists, on the other hand, are able to explain that, but not an individual's journey from the processing of information to its translation into concrete creative outcomes. Controlling for the perceptions of consequences, future research efforts could focus on the mechanics of how higher-level learning is translated into concrete set of innovative ideas. Such line of enquiry will not just help in establishing the basis for a more in-depth integration of the knowledge creation view and the organizational learning theorists' approaches, but also that for the integration of the behavioural and organizational learning theorists approaches to learning.

The tacit dimension of knowledge is less easy to be investigated. There are issues related to the definition, degree of subjectivity, lack of objectivity, etc. which make the operationalization of tacit

knowledge rather difficult (Ambrosini & Bowman, 2001). Our framework, however, is focused more on the objective processes through which tacit experiences are tapped. As explained earlier, we believe that while these processes could be varied, the information that is allowed by organizations to emanate from these processes mainly remains different in terms of levels of deviations. Our research, however, is faced with a challenge of a different nature. We attempt to isolate subtle differences in structures and processes that are employed within an organization. For that, we need to ensure that the firms under investigation are: a) essentially knowledge creating organizations; and b) sufficiently large to allow the differences in levels to be clearly isolated. Hence, for us the organizations that are studied need to have some degree of established knowledge creating cultures, where knowledge creation is encouraged, or as Housel & Bell (2001) identify, even rewarded, irrespective of the industry that they come from. Future generalisation efforts can, however, examine the differences in levels that may exist across different industries.

The research on learning and creativity has been conducted at several different levels of analysis. A large number of studies, as explained earlier in the discussion, have focused at the organizational level. It can, however, be argued that the underlying assumption of these studies is that learning activities can be visualised at the most aggregate level of a firm. Such focus could be too remote to derive valuable lessons which are of use to practitioners. Alternatively, a focus on specific projects has the advantage of an easier recall by those involved, and hence a more accurate and detailed data gathering, with adequate allowance for contingencies. Such an approach, however, could be criticised for a short-term horizon, the limitations on lessons which can be learned from subsequent projects, or being too focused to allow redevelopment of a company's innovative efforts. Our framework, by bringing together the organizational and product dimensions, partly addresses these weaknesses. It is flexible with regard to the organizational level, and yet detailed with regard to the contribution that experiences make in innovative outcomes/behaviours. A detailed analysis of how these experiences feed into subsequent projects is beyond the scope of our framework, but not that of future research directions that are suggested.

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